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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,155	03/24/2004	William P. Corbett	2003-0839.02	5269

21972   7590   03/07/2007
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EXAMINER
PHAM, HAI CHI

ART UNIT	PAPER NUMBER
2861	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

	Application No.	Applicant(s)
Office Action Summary	10/808,155	CORBETT ET AL.
	Examiner	Art Unit
	Hai C. Pham	2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE **3** MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *11 December 2006*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-38* is/are pending in the application.

    4a) Of the above claim(s) *30-38* is/are withdrawn from consideration.

5) ☒ Claim(s) *29* is/are allowed.

6) ☒ Claim(s) *1-7, 14-24, 26 and 28* is/are rejected.

7) ☒ Claim(s) *8-13, 25 and 27* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/21/06*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2.   Claims 1, 3, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by

Imaizumi et al. (US 6.441.915).

Imaizumi et al. discloses an image forming apparatus and method for adjusting

an image to compensate for bow/distortion or laser beam process direction position

errors (e.g., sub-scan image distortion correction), the method comprising reading

image data from a first memory location (FIFO 541, Fig. 14A), said image data

comprising pixels arranged in a plurality of columns and a plurality of rows (FIFO 541

including 24 line memories, each storing a line of image data of a plurality of pixels) (col.

13, line 66 to col. 14, line 15), performing pixel shifts on select columns of said image

data based upon a bow profile (e.g., image distortion correction RAMs 5482 and 5483)

that characterizes process direction position errors of Pels written by a laser beam as it

traverses generally in a scan direction, to define adjusted image data (the image

distortion correction determines the amount of shift of exposure position in both the

main and sub-scanning directions), storing said adjusted image data to a second

memory location (the corrected image is stored in the interface FIFO memory to be

used as driving data for driving the laser exposure head) (Fig. 18), and deriving a laser

signal from said adjusted image data in said second memory location (col. 17, lines 24-

57).

Imaizumi et al. further teaches:

- said second memory location (interface FIFO memory) stores said adjusted

  image data for less than the entirety of said image (the interface FIFO memory

  stores one corrected line of pixel data at a time),

- said pixel shifts are performed from the top to the bottom of said image.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imaizumi

et al. in view of Yoshida et al. (US 5,719,680).

Imaizumi et al. discloses all the basic limitations of the claimed invention except

for the first and said second memory locations comprising first and second areas of a

main system memory, the bow microprocessor.

Yoshida et al., an acknowledged prior art, discloses a color printer and a method

for correcting skew in the scanning lines controlled by the microprocessor (MPU 51a),

wherein the image data is read into the ROM (51b), which also serves as a correction

data storage for correcting the scanning line skew, the skew correction.

It would have been obvious at the time the invention was made to a person

having ordinary skill in the art to modify the device of Imaizumi et al. by providing the

main system memory having first and second areas for the first and second memories

as taught by Yoshida et al. The motivation for doing so would have been to provide a

more compact memory system to accommodate for the needs of image storage during

the bow process.

5.   Claims 4, 21, 23 and 26 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Imaizumi et al. in view of Pham et al. (US 5,585,836).

Imaizumi et al. discloses all the basic limitations of the claimed invention except

for organizing said image data into a plurality of bands wherein pixel shifts are

performed on select columns of each band based upon said bow profile and said

plurality of bands are processed one band at a time, and applying pixels shifts on select

columns of the image data.

Pham et al. discloses in Figs. 4-5 an electrophotographic color image recording

apparatus and method with correction for bow or laser beam process direction position

errors, the method comprising reading image data from a first memory location (data

source 201), said image data comprising pixels arranged in a plurality of columns and a

plurality of rows (each line of image data comprises a plurality of pixels), performing

pixel shifts on select columns of said image data based upon a bow profile (image shift

information for each LED being stored in the look-up tables 206, 207 for bow correction) that characterizes process direction position errors of Pels written by a laser beam as it traverses generally in a scan direction, to define adjusted image data (the image shift information being the amount of position errors of the pixels in the process direction as a measure of the distance from the reference line of the row of the LEDs) (col. 7, line 29 to col. 8, line 31), and deriving a laser signal from said adjusted image data in said second memory location (the bow-corrected line of pixel data at 403 is used to drive the LEDs) (Figs. 8-9). Pham et al. further teaches organizing said image data into a plurality of bands (at least three groups A-C of image data), each band comprising a predetermined number of columns and a predetermined number of rows of pixels of said image data (the three lines of pixel data formed bands having three rows of pixel data and a number of columns represented by the groups A, B, C), wherein pixel shifts are performed on select columns of each band based upon said bow profile and said plurality of bands are processed one band at a time (col. 13, line 26 to col. 14, line 15).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Imaizumi et al. in performing the bow correction by organizing the input image data into a plurality of bands and shifting the pixels on selected columns of each band based on the bow profile as taught by Pham et al. The motivation for doing so would have been to precisely compensate for the bow error across the main scanning direction.

Imaizumi et al. further teaches:

- a third memory location (image distortion correction RAMs 5482 and 5483), wherein said bow profile is stored in said third location as a plurality of instructions that describe the process direction shifts for corresponding Pel positions along said scan path required to compensate for said laser beam process direction position errors (Fig. 17),

- said electrophotographic device comprises a color device, and said bow processor performs pixel shifts for each of the cyan, yellow, magenta and black image planes (the bow correction is made not only to correct the skew in the scanning line of each color but also to correct the misregistration of the colors in the electrophotographic color image recording apparatus) (col. 18, lines 37-45).

6. Claims 14-18, 20, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaizumi et al. in view of Pham et al. and Yoshida et al.

Imaizumi et al. in view of Pham et al. discloses the instruction indicating which pixel in the different groups of pixels is to be shifted or corrected, the instruction being a 2-bit word that represents image shift for each pixel, and the shift of the pixels being performed relative to adjacent columns or groups (Pham et al., col. 12, lines 34-56), but fails to teach the specific indication of whether that column should be shifted up, down, or not shifted, the instruction being a one-bit instruction indicating the up or down-shifting of the pixels, constraining said instructions according to rules that limit the number of process direction shifts that can be corrected, and the instructions being constrained to limit the maximum amplitude of pixel shifts allowable in said bow profile.

Yoshida et al. discloses a color printer and a method for correcting skew in the scanning lines controlled by the microprocessor (MPU 51a), wherein the image data is read into the ROM (51b), which also serves as a correction data storage for correcting the scanning line skew, the skew correction further including a one-bit instruction specifying left-down skew or left-up skew for correction is provided to operate the DIP switch 53, and wherein the correction data limit the shift of the pixels up to 5 pixels in either directions depending on the amount of skew (col. 5, lines 1-6) (Figs. 4, 9).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Imaizumi et al. in view of Pham et al. to provide the bow correction instruction configured with one-bit instruction for the indication of the up or down-shifting of the pixels and to restrict the maximum amplitude of pixel shifts allowable in the bow profile as taught by Yoshida et al. The motivation for doing so would have been to provide a complete instruction for effectively shifting the pixel to the appropriate position with a reference line.

7.   Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaizumi et al. in view of Pham et al., as applied to claim 4 above, and further in view of Kerby et al. (US 6,445,404).

Imaizumi et al. in view of Pham et al. discloses all the basic limitations of the claimed invention except for the second memory location is dimensioned to store at least two bands of adjusted image data, a first band of adjusted image data is processed from said second memory location for deriving said laser signal while pixel

shifts are performed on said image data according to said bow profile such that a second band of adjusted image data is stored in said second memory location, and processing of said first band of adjusted image data to derive said laser signal must be complete before storing a third band of adjusted image data into said second memory location.

Kerby et al. discloses an image forming apparatus provided with a single laser diode and two dedicated line buffers for providing signals to drive the laser diode, wherein after driving the laser diode with the raster data stored in the first line buffers, the laser diode is then driven by the raster data contained in the second line buffer while the first line buffer reads in new (i.e., third) raster data, the switching between the two line buffers continues until the print image is complete (col. 7, lines 55-67).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the device of Imaizumi et al. in view of Pham et al. with a storage containing two bow-corrected lines of pixel data and the switching configuration of the line data memory for recording the image data as taught by Kerby et al. the motivation for doing so would have been to obtain an efficient use of the memory and a high speed image recording.

8.   Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imaizumi et al. in view of Pham et al., as applied to claim 21 above, and further in view of Baldwin (US 5,764,243).

Imaizumi et al. in view of Pham et al. discloses all the basic limitations of the claimed invention except for the image data is transferred to said bow processor and said bow processor writes said adjusted image data to said second memory location using direct memory access transactions.

Baldwin teaches a computer processing method for transferring image data into FIFO memory using direct memory access transactions so as to automatically ensure that there is room in the FIFO before it performs further transfers (col. 15, lines 8-37).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the bow microprocessor in the modified device of Imaizumi et al. with the DMA controller during the image data transfer as taught by Baldwin. The motivation for doing so would have been to prevent overflow of the memory to occur as suggested by Baldwin.

9.   Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imaizumi et al. in view of Pham et al., as applied to claim 21 above, and further in view of O'Hara et al. (US 6,819,351).

Imaizumi et al. in view of Pham et al. discloses all the basic limitations of the claimed invention except for the bow processor being implemented in an application specific integrated circuit.

O'Hara et al. discloses an electronic bow correction for an image forming apparatus, wherein the bow process (CEPA function) is implemented in an ASIC (col. 12, lines 8-30).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Imaizumi et al. by implementing the bow process in an ASIC as taught by O'Hara et al. The motivation for doing so would have been to provide a versatile laser diver in a compact package.

Allowable Subject Matter

10. Claim 29 is allowed.

11. Claims 8-13, 25 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments with respect to claims 1-7, 14-24, 26 and 28 have been considered but are moot in view of the new grounds of rejection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HAI PHAM
PRIMARY EXAMINER
March 3, 2007